Question 1:
What is a life-cycle assessment?

The DfE Computer Display Project (CDP) conducted this analysis of computer displays using a life-cycle assessment (LCA) approach, which allows for a comprehensive analysis of the environmental consequences of a product system over its entire life. LCA, which is increasingly being used by industry, contains four major steps:

1. **Goal Definition and Scoping** lays out why the LCA is being conducted, its intended use, and the system or data categories to be studied.
2. **Life-Cycle Inventory (LCI)** involves quantifying inputs (e.g., raw materials and fuel) and outputs (e.g., emissions, effluents, and products).
3. **Life-Cycle Impact Assessment (LCIA)** involves characterizing the effects of the inputs and outputs (as identified in the life-cycle inventory step) on the environment and human and ecological health.
4. **Improvement Assessment or Life-Cycle Interpretation** uses findings from the analysis to identify and evaluate opportunities for reducing life-cycle environmental impacts or to reach conclusions and recommendations. This step is left to the electronics industry and others to complete, using the results of this study.

In the LCI and LCIA steps, the inputs and outputs and environmental impacts associated with the product throughout its life are quantified and characterized for each life-cycle stage: raw material extraction, materials processing, product manufacturing, product use, and end-of-life. Each of these major stages of the product life-cycle are described in Figure 1.1.

In addition to the LCA, the study incorporated some methodologies more typical of the EPA Design for the Environment (DfE) Program's Cleaner Technologies Substitutes Assessment (CTSA) approach. Such an approach includes a more detailed assessment of the impacts of specific chemicals, and an evaluation of comparative cost and performance of different displays. For this analysis, the DfE streamlined CTSA approach was incorporated by analyzing three specific chemicals found in computer displays (lead, mercury, and liquid crystals), and by including a consideration of product costs and performance.

Figure 1.1. Life-cycle stages of a computer display